

## CLAIMS

1. A bipolar type semiconductor device in which at least a part of a region where an electron and a hole are recombined during  
5 current flowing is formed with a silicon carbide epitaxial layer that has been grown from the surface of a silicon carbide substrate, wherein a surface roughness Rms of the surface of the silicon carbide substrate on which an epitaxial growth is carried out is in the range of 0.1 to 0.6 nm.

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2. The bipolar type semiconductor device as defined in claim 1, wherein an off-angle of the silicon carbide substrate is in the range of 1 to 4°.

15 3. The bipolar type semiconductor device as defined in claim 1, wherein a crystal plane of the silicon carbide substrate in which the epitaxial growth is carried out is the (000-1) C plane and an off-angle of the substrate is in the range of 1 to 8°.

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4. A process for manufacturing a bipolar type semiconductor device in which at least a part of a region where an electron and a hole are recombined during current flowing is formed with a silicon carbide epitaxial layer that has been grown from the

surface of a silicon carbide substrate, wherein the surface of the silicon carbide substrate is treated by hydrogen etching and the epitaxial layer is then formed by the epitaxial growth of silicon carbide from the treated surface.

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5. The process for manufacturing a bipolar type semiconductor device as defined in claim 4, wherein the surface of the silicon carbide substrate is treated by chemical mechanical polishing and hydrogen etching in this order, and the epitaxial layer  
10 is then formed by the epitaxial growth of silicon carbide from the treated surface.

6. The process for manufacturing a bipolar type semiconductor device as defined in claim 4 or 5, wherein the epitaxial growth  
15 is carried out from the surface of the silicon carbide substrate with an off-angle in the range of 1 to 4°.

7. The process for manufacturing a bipolar type semiconductor device as defined in claim 4 or 5, wherein the epitaxial growth  
20 is carried out from the (000-1) C plane of the silicon carbide substrate with an off-angle in the range of 1 to 8°.